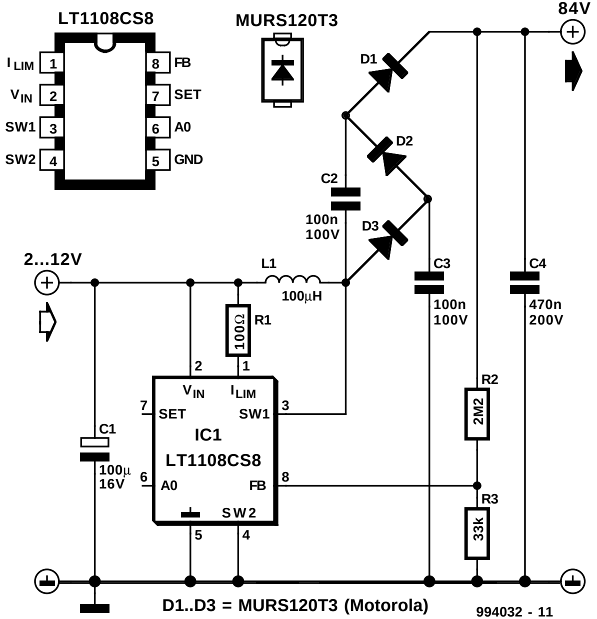
switching regulator

030



G. Kleine

Potentials of up to more than 100 V may be generated by a switching regulator IC complemented by a cascode circuit of diodes and reservoir capacitors. The regulator pumps the voltage up in two stages to the requisite output level determined by potential divider R_2-R_3 according to the equation

$$U_{\text{out}} = 1.245(R_2 + R_3)/R_3.$$

With resistor values specified in the diagram, the output voltage is 84 V. Resistor R_3 may be replaced by a fixed resistor and a 10 kΩ preset.

Regulator IC_1 applies the direct voltage at the input to inductor L_1. Internally, pin 3 (SW1) is periodically short-circuited to pin 4 (SW2 = earth). When SW1 is opened, a counter-e.m.f. pulse is generated across L_1, which charges capacitor C_3 via diode D_3. The voltage pulse is also applied to C_2. The voltage across C_3 is applied to C_4 via D_2 together with that across C_2 via D_1. The diodes used must be fast types with a high reverse voltage rating. In the prototype, Motorola Type MURS120T3 diodes were used.

The current through switches SW1 and SW2 is determined by resistor R_1. With a resistance of 100 Ω as specified, it is about 700 mA. The peak current must not exceed 1.5 A.

CAUTION The generated voltages may be lethal, so care must be taken in handling the circuit. Also, after the input voltage has been switched off, capacitor C_4 may retain a lethal charge for some time.

Detailed information on Linear Technology's regulator IC Type LT1108 from: http://www.linear-tech.com

[994032]